



SEQUENCE LISTING

<110> YANAI, Koji
OKAKURA, Kaoru
YASUDA, Shohei
WATANABE, Manabu
MIYAMOTO, Koichi
MIDOH, Naoki
MURAKAMI, Takeshi

<120> Transformants producing secondary metabolites
modified with functional groups, and novel
biosynthesis genes

<130> 2002-0451A/LC/00144

<140> NEW

<141> 2002-03-29

<150> JP 11-276314

<151> 1999-09-29

<160> 23

<170> PatentIn Ver. 2.1

<210> 1

<211> 2061

<212> DNA

<213> Streptomyces venezuelae

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<221> CDS

<222> (1)..(2058)

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Phe	Gln	Tyr	Ile	Gly	Glu	Ala	Thr	Gly	Gln	Pro	Pro	Val	Val	Val	Pro	
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aac	gac	gcc	gac	tgg	tgc	cgg	ctg	ccc	gtc	gag	gac	ttc	gac	gcg	atc	144
Asn	Asp	Ala	Asp	Trp	Ser	Arg	Leu	Pro	Val	Glu	Asp	Phe	Asp	Ala	Ile	
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gtc	gtg	tcc	ccg	ggc	ccc	ggc	agc	ccc	gac	cgg	gaa	cgg	gac	ttc	gga	192
Val	Val	Ser	Pro	Gly	Pro	Gly	Ser	Pro	Asp	Arg	Glu	Arg	Asp	Phe	Gly	
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Ile	Ser	Arg	Arg	Ala	Ile	Thr	Asp	Ser	Gly	Leu	Pro	Val	Leu	Gly	Val	
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Cys	Leu	Gly	His	Gln	Gly	Ile	Ala	Gln	Leu	Phe	Gly	Gly	Thr	Val	Gly		
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Leu	Ala	Pro	Glu	Pro	Met	His	Gly	Arg	Val	Ser	Glu	Val	Arg	His	Thr		
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Gly	Glu	Asp	Val	Phe	Arg	Gly	Leu	Pro	Ser	Pro	Phe	Thr	Ala	Val	Arg		
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Tyr	His	Ser	Leu	Ala	Ala	Thr	Asp	Leu	Pro	Asp	Glu	Leu	Glu	Pro	Leu		
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Ala	Trp	Ser	Asp	Asp	Gly	Val	Val	Met	Gly	Leu	Arg	His	Arg	Glu	Lys		
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Gly	Arg	Glu	Ile	Met	Ala	Asn	Phe	Arg	Asp	Leu	Ala	Leu	Ala	His	His		
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cgg	gca	cgg	cgc	cac	ggg	gcc	gac	tcc	ccg	tac	gaa	ctc	cac	gtg	cgc	624	
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cgc	gtc	gac	gtg	ctg	ccg	gac	gcc	gaa	gag	gta	cgc	cgc	ggc	tgc	ctg	672	
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Pro	Gly	Glu	Gly	Thr	Thr	Phe	Trp	Leu	Asp	Ser	Ser	Ser	Val	Leu	Glu		
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	290					295				300							
ttc	gag	ttc	aac	ctc	ggc	tac	gtc	ggc	tac	ctc	ggc	tac	gag	ctg	aag	960	
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gcg gag acc acc ggc gac ccc gcg cac cgg tcc ccg cac ccc gac gcc Ala Glu Thr Thr Gly Asp Pro Ala His Arg Ser Pro His Pro Asp Ala 325 330 335				1008
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gcg ccc gtg cac cag ctg gtg tcg acc atc cgg gga cgg ctg cgg ccc 1728
 Ala Pro Val His Gln Leu Val Ser Thr Ile Arg Gly Arg Leu Arg Pro 575
 565 570

ggc acc agc acc gcc gcc tgc gta cgc gcc gcc ttc ccc ggc ggc tcc 1776
 Gly Thr Ser Thr Ala Ala Cys Val Arg Ala Ala Phe Pro Gly Gly Ser 590
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 Met Thr Gly Ala Pro Lys Lys Arg Thr Met Glu Ile Ile Asp Arg Leu 605
 595 600

gag gaa ggc ccc cgg ggc gtc tac tcc ggg ggc ctc gga tgg ttc gcc 1872
 Glu Glu Gly Pro Arg Gly Val Tyr Ser Gly Ala Leu Gly Trp Phe Ala 620
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ctc agc ggc gcc gcc gac ctc agc atc gtc atc cgc acc atc gtg ctg 1920
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 Ser Asp Gln Glu Glu Glu Phe Thr Glu Thr Val Val Lys Ala Arg Ala 670
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Val Val Ser Pro Gly Pro Gly Ser Pro Asp Arg Glu Arg Asp Phe Gly 60
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Ile Ser Arg Arg Ala Ile Thr Asp Ser Gly Leu Pro Val Leu Gly Val

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Gly	Ala	Ser	Arg	Phe	Ser	Phe	Leu	Gly	Asp	Asp	Arg	Gly	Pro	Leu	Ala
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Glu	Tyr	Leu	Thr	Tyr	Arg	Val	Ala	Asp	Gly	Val	Val	Ser	Val	Arg	Gly
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305					310					315					320
Ala	Glu	Thr	Thr	Gly	Asp	Pro	Ala	His	Arg	Ser	Pro	His	Pro	Asp	Ala
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Ala	Phe	Leu	Phe	Ala	Asp	Arg	Ala	Ile	Ala	Leu	Asp	His	Gln	Glu	Gly
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Cys	Cys	Tyr	Leu	Leu	Ala	Leu	Asp	Arg	Arg	Gly	His	Asp	Asp	Gly	Ala
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Ala Tyr Leu Lys Arg Ile Asp Glu Cys Leu Lys Glu Ile Arg Asn Gly 420 425 430		
Glu Ser Tyr Glu Ile Cys Leu Thr Asn Met Val Thr Ala Pro Thr Glu 435 440 445		
Ala Thr Ala Leu Pro Leu Tyr Ser Ala Leu Arg Ala Ile Ser Pro Val 450 455 460		
Pro Tyr Gly Ala Leu Leu Glu Phe Pro Glu Leu Ser Val Leu Ser Ala 465 470 475 480		
Ser Pro Glu Arg Phe Leu Thr Ile Gly Ala Asp Gly Gly Val Glu Ser 485 490 495		
Lys Pro Ile Lys Gly Thr Arg Pro Arg Gly Gly Thr Ala Glu Glu Asp 500 505 510		
Glu Arg Leu Arg Ala Asp Leu Ala Gly Arg Glu Lys Asp Arg Ala Glu 515 520 525		
Asn Leu Met Ile Val Asp Leu Val Arg Asn Asp Leu Asn Ser Val Cys 530 535 540		
Ala Ile Gly Ser Val His Val Pro Arg Leu Phe Glu Val Glu Thr Tyr 545 550 555 560		
Ala Pro Val His Gln Leu Val Ser Thr Ile Arg Gly Arg Leu Arg Pro 565 570 575		
Gly Thr Ser Thr Ala Ala Cys Val Arg Ala Ala Phe Pro Gly Gly Ser 580 585 590		
Met Thr Gly Ala Pro Lys Lys Arg Thr Met Glu Ile Ile Asp Arg Leu 595 600 605		
Glu Glu Gly Pro Arg Gly Val Tyr Ser Gly Ala Leu Gly Trp Phe Ala 610 615 620		
Leu Ser Gly Ala Ala Asp Leu Ser Ile Val Ile Arg Thr Ile Val Leu 625 630 635 640		
Ala Asp Gly Gln Ala Glu Phe Gly Val Gly Gly Ala Ile Val Ser Leu 645 650 655		
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680

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 Leu Asp Gly Thr Leu Leu Asp Thr Val Arg Arg Arg Ile Asp Leu Gly
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 gtc cgc atc gcg cgg tac aag tcc cgg cac ggc gtc ccg atg atg cag 144
 Val Arg Ile Ala Arg Tyr Lys Ser Arg His Gly Val Pro Met Met Gln
 35 40 45

 ccc ggc cgg gtc agc ctg gtc aag gac agg gcc gcc cgc tac gcc gcc 192
 Pro Gly Arg Val Ser Leu Val Lys Asp Arg Ala Ala Arg Tyr Ala Ala
 50 55 60

 gac cac ggc ctc gac gaa tgc ttc ctg gtg aac ctc tac gac gtg atc 240
 Asp His Gly Leu Asp Glu Ser Phe Leu Val Asn Leu Tyr Asp Val Ile
 65 70 75 80

 atc acg gag atg tgc cgc gtc gag gac ctg gtg atg agc cgg gag agc 288
 Ile Thr Glu Met Cys Arg Val Glu Asp Leu Val Met Ser Arg Glu Ser
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<210> 4
 <211> 103
 <212> PRT
 <213> Streptomyces venezuelae

<400> 4
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 35 40 45

Pro Gly Arg Val Ser Leu Val Lys Asp Arg Ala Ala Arg Tyr Ala Ala
50 55 60

Asp His Gly Leu Asp Glu Ser Phe Leu Val Asn Leu Tyr Asp Val Ile
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Ile Thr Glu Met Cys Arg Val Glu Asp Leu Val Met Ser Arg Glu Ser
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Leu Thr Ala Glu Asp Arg Arg
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Gly Gly Met Phe Ala Gly Leu Leu Arg Glu Ala Gly Ser Arg Thr Leu
20 25 30

gtc gtc gac ctc gta ccg ccg ccg gga cgg ccg gac gcc tgc ctg gtg 144
Val Val Asp Leu Val Pro Pro Pro Gly Arg Pro Asp Ala Cys Leu Val
35 40 45

ggc gac gtc acc gcg ccg ggg ccc gaa ctc gcg gcc gcc ctc cgg gac 192
Gly Asp Val Thr Ala Pro Gly Pro Glu Leu Ala Ala Ala Leu Arg Asp
50 55 60

gcg gac ctc gtc ctg ctc gcc gta cac gag gac gtg gcc ctc aag gcc 240
Ala Asp Leu Val Leu Leu Ala Val His Glu Asp Val Ala Leu Lys Ala
65 70 75 80

gtg gcg ccc gtg acc cgg ctc atg cgg ccg ggc gcg ctg ctc gcc gac 288
Val Ala Pro Val Thr Arg Leu Met Arg Pro Gly Ala Leu Leu Ala Asp
85 90 95

acc ctg tcc gtc cgg acg ggc atg gcc gcg gag ctc gcg gcc cac gcc 336
Thr Leu Ser Val Arg Thr Gly Met Ala Ala Glu Leu Ala Ala His Ala
100 105 110

ccc ggc gtc cag cac gtg ggc ctc aac ccg atg ttc gcc ccc gcc gcc 384
Pro Gly Val Gln His Val Gly Leu Asn Pro Met Phe Ala Pro Ala Ala
115 120 125

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Gly Met Thr Gly Arg Pro Val Ala Ala Val Val Thr Arg Asp Gly Pro	
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ggc gtc acg gcc ctg ctg cgg ctc gtc gag ggc ggc ggc ggc agg ccc	480
Gly Val Thr Ala Leu Leu Arg Leu Val Glu Gly Gly Gly Arg Pro	
145 150 155 160	
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Val Arg Leu Thr Ala Glu Glu His Asp Arg Thr Thr Ala Ala Thr Gln	
165 170 175	
gcc ctg acg cac gcc gtg ctc ctc tcc ttc ggg ctc gcc ctc gcc cgc	576
Ala Leu Thr His Ala Val Leu Leu Ser Phe Gly Leu Ala Leu Ala Arg	
180 185 190	
ctc ggc gtc gac gtc cgg gcc ctg gcg gcg acg gca ccg ccg ccc cac	624
Leu Gly Val Asp Val Arg Ala Leu Ala Ala Thr Ala Pro Pro Pro His	
195 200 205	
cag gtg ctg ctc gcc ctc ctg gcc cgt gtg ctc ggc ggc agc ccc gag	672
Gln Val Leu Leu Ala Leu Leu Ala Arg Val Leu Gly Gly Ser Pro Glu	
210 215 220	
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Val Tyr Gly Asp Ile Gln Arg Ser Asn Pro Arg Ala Ala Ser Ala Arg	
225 230 235 240	
cgg gcg ctc gcc gag gcc ctg cgc tcc ttc gcc gcg ctg gtc ggc gac	768
Arg Ala Leu Ala Glu Ala Leu Arg Ser Phe Ala Ala Leu Val Gly Asp	
245 250 255	
gac ccg gac cgt gcc gac gcc ccc ggg cgc gcc gac gcc ccc ggc cat	816
Asp Pro Asp Arg Ala Asp Ala Pro Gly Arg Ala Asp Ala Pro Gly His	
260 265 270	
ccc ggg gga tgc gac ggc gcc ggg aac ctc gac ggc gtc ttc ggg gaa	864
Pro Gly Gly Cys Asp Gly Ala Gly Asn Leu Asp Gly Val Phe Gly Glu	
275 280 285	
ctc cgc cgg ctc atg gga ccg gag ctc gcg gcg ggc cag gac cac tgc	912
Leu Arg Arg Leu Met Gly Pro Glu Leu Ala Ala Gly Gln Asp His Cys	
290 295 300	
cag gag ctg ttc cgc acc ctc cac cgc acc gac gac gaa ggc gag aag	960
Gln Glu Leu Phe Arg Thr Leu His Arg Thr Asp Asp Glu Gly Glu Lys	
305 310 315 320	
gac cga tga	969
Asp Arg	

<210> 6
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<400> 6

Met Ser Gly Phe Pro Arg Ser Val Val Val Gly Gly Ser Gly Ala Val
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Gly Gly Met Phe Ala Gly Leu Leu Arg Glu Ala Gly Ser Arg Thr Leu
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Val Val Asp Leu Val Pro Pro Pro Gly Arg Pro Asp Ala Cys Leu Val
35 40 45

Gly Asp Val Thr Ala Pro Gly Pro Glu Leu Ala Ala Ala Leu Arg Asp
50 55 60

Ala Asp Leu Val Leu Leu Ala Val His Glu Asp Val Ala Leu Lys Ala
65 70 75 80

Val Ala Pro Val Thr Arg Leu Met Arg Pro Gly Ala Leu Leu Ala Asp
85 90 95

Thr Leu Ser Val Arg Thr Gly Met Ala Ala Glu Leu Ala Ala His Ala
100 105 110

Pro Gly Val Gln His Val Gly Leu Asn Pro Met Phe Ala Pro Ala Ala
115 120 125

Gly Met Thr Gly Arg Pro Val Ala Ala Val Val Thr Arg Asp Gly Pro
130 135 140

Gly Val Thr Ala Leu Leu Arg Leu Val Glu Gly Gly Gly Gly Arg Pro
145 150 155 160

Val Arg Leu Thr Ala Glu Glu His Asp Arg Thr Thr Ala Ala Thr Gln
165 170 175

Ala Leu Thr His Ala Val Leu Leu Ser Phe Gly Leu Ala Leu Ala Arg
180 185 190

Leu Gly Val Asp Val Arg Ala Leu Ala Ala Thr Ala Pro Pro Pro His
195 200 205

Gln Val Leu Leu Ala Leu Leu Ala Arg Val Leu Gly Gly Ser Pro Glu
210 215 220

Val Tyr Gly Asp Ile Gln Arg Ser Asn Pro Arg Ala Ala Ser Ala Arg
225 230 235 240

Arg Ala Leu Ala Glu Ala Leu Arg Ser Phe Ala Ala Leu Val Gly Asp
245 250 255

Asp Pro Asp Arg Ala Asp Ala Pro Gly Arg Ala Asp Ala Pro Gly His
260 265 270

Pro Gly Gly Cys Asp Gly Ala Gly Asn Leu Asp Gly Val Phe Gly Glu
275 280 285

Leu Arg Arg Leu Met Gly Pro Glu Leu Ala Ala Gly Gln Asp His Cys
290 295 300

Gln Glu Leu Phe Arg Thr Leu His Arg Thr Asp Asp Glu Gly Glu Lys
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Asp Arg

<210> 7
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 <213> Artificial Sequence

<220>
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 the pabAB gene

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 the pabAB gene

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<210> 9
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 <212> DNA
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 <213> Artificial Sequence

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 the papB gene

<400> 12
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<210> 13
 <211> 29
 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:PCR primer for
 the papC gene

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 <210> 16
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 <210> 17
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<223> Description of Artificial Sequence:PCR primer for the Abp1 gene

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<210> 23
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